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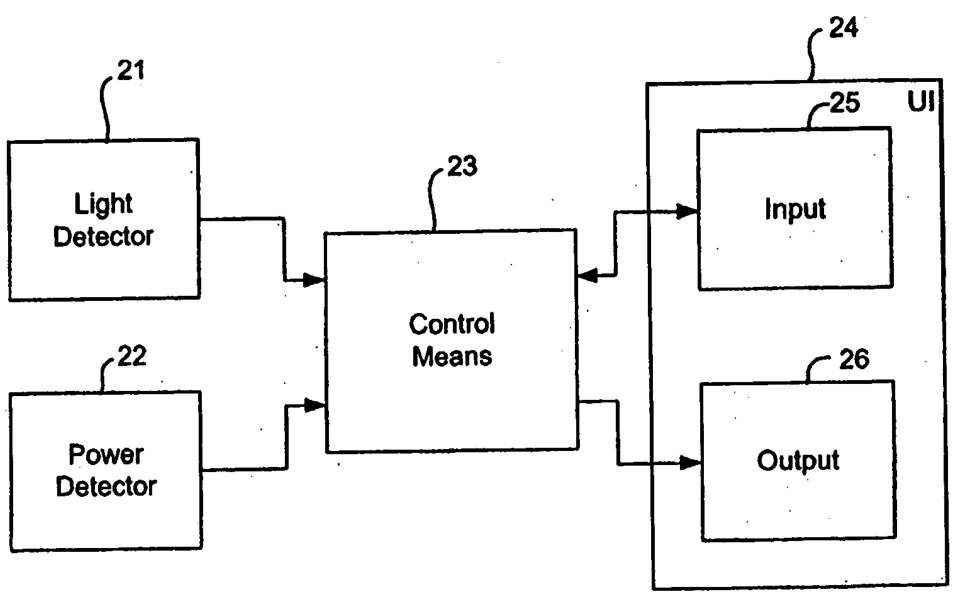

(57) Abstract

A handportable device is disclosed which comprises a user interface (24), means (21; 22) for determining a current circumstance of the device, a comparator for comparing the current circumstance with a given threshold, and control means (23) for controlling functionality relating to the user interface (24) depending upon the output of the comparator. The current circumstance may, for example, be a particular condition (e.g. status of the device such as low battery or mode of operation) or a particular situation (e.g. time of day, ambience).

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A Portable Device

The present invention relates to hand held devices such as radiotelephones, and in particular to the illumination and operability of the user interface.

Hand held devices such as radiotelephones conventionally have their user interface (e.g. display and keys) illuminated, to enable their use in the dark. However, back lighting of such input and output devices causes a drain on the battery of the device. Devices are known which conserve battery power by only illuminating the display and keypad lights for a predetermined period (e.g. 15 seconds) after a key press or incoming call.

According to the present invention, there is provided a portable device comprising: a user interface; means for determining a current circumstance of the device; a comparator for comparing the current circumstance with a given threshold; and control means for controlling functionality relating to user interface depending upon the output of the comparator.

The current circumstance, for example, may be a particular condition (e.g. the status of the device itself, such as low battery or mode of operation). Alternatively, the current circumstance may be a particular situation (e.g. time of day, geographical location or ambience such as whether it is stored in a pocket, brief case or the like or whether it is natural/artificial day light).

The control means may control an illuminator for the user interface or the actual operability of the user interface itself (e.g. whether it is wholly or partially on or off). For instance, the control means may only the illumination

on if the surroundings are dark. Accordingly, power in the device of the present invention may be conserved.

In a device concerned with its current situation, the means for determining the current circumstance typically comprises a light detector or light estimator. The light detector is advantageous as it provides efficient power conservation due to its detection of actual light, whether it be day light or artificial light. The light estimator, on the other hand, also provides good power conservation, and has the additional benefit of not requiring additional hardware components to those generally found in portable devices.

Turning first to a device with a light detector, the control means of such a device may turn a user interface illuminator off, for example, if the light exceeds a threshold. That is the illuminator is turned off when there is sufficient light for a user to see the user interface, and on when there is insufficient light. Preferably, the device also compares the light detected with the second lower threshold. In such an embodiment, the illuminator is off if the light detected is above the first threshold, on if it is below the second threshold, and variable if it is between the two. Examples of variable illumination include only back lighting one or other of a user input and user output of the user interface (for example a keyboard and display), or by varying the intensity of the illumination.

Furthermore, the output of the light detector may be compared over a predetermined period (e.g. 30 seconds) to determine whether any change in intensity is found. A determination of no such change can be used as an indication that the device is not currently being used; for example it may be in a pocket, brief case or remote form the user etc. In this event, the illuminator and/or user interface may be suspended.

Turning now to a device with a light estimator, again the control means may control the user interface illuminator Turning now a device with a light estimator, again the control means may control the user interface illuminator depending on the result of the comparison of the light with the first and optionally also the second thresholds.

The light estimator bases its estimation on time information. It preferably also bases its estimation on date, so as to take account of seasonal changes. Many current devices have real time clocks, and in such devices time and date information may be obtained directly from the real time clock.

Accuracy of the light estimation may be further improved by providing location information. Such location information may be set by the user, and may, for example, relate to the user's country, state etc. However, if the device is a communications device a number of further options are available. For example, the location could be determined based on the communication network operator. Such information could be stored in the phone. For example by way of a look-up table. Alternatively, it may be provided on the SIM card, or alternatively by the network itself. Furthermore, the location information could be provided by location systems such as GPS (Global Positioning System).

The device may operate in different modes, depending on the desired profile. Profiles may include outdoor, meeting, office etc. Consequently, such a device may take into account artificial light conditions, and thus improve power conservation. For example, the backlighting default for the meeting and office profiles may be off.

Selection of the desired profile may be altered manually by the user, or if the device has a calendar, it could be linked to the calendar's contents.

Further, the device is arranged so that the user can personalise the backlighting settings via the user interface.

In a device concerned with its current condition, the means for determining the current circumstance typically comprises means for determining the current condition of the device, such as a power detector which can determine the battery power level. The control means of such a device may turn the user interface illuminator off if it is less than a first threshold, for example. This enables power consumption to be reduced when the battery is low, thereby extending the operational time of the device (for example the standby and talk time in the mobile communications device). Preferably, the device also compares the power detected with a second lower threshold. In such an embodiment the illuminator is on if the power detected is above the first threshold, the illuminator and/or part of the user interface operation is suspended if the power detected is below the second threshold, and the illuminator is at least partially off if the power detected is between the first and second thresholds.

In a device in which the means for determining a current circumstance of the device determines both power and light levels, the control means operates on the basis of light detection until the power level falls below the first threshold level, at which time the control means switches to operate on the basis of the power detected.

According to another aspect of the present invention, there is provided a method of controlling functionality of the user interface of a portable device, the method comprising determining a current circumstance of the device, comparing the current circumstance with a given threshold, and controlling

functionality relating to the user interface depending upon the result of the comparison.

According to a further aspect of the present invention, there is provided a system for controlling the functionality of a user interface of a portable device, the system comprising, means for determining a current circumstance of the device, a comparator for comparing the current circumstance with a given threshold, and control means for controlling functionality relating to the user interface depending upon the output of the comparator. The system may, for example, comprise a communications network which provides communications device with data for determining an estimation of the light surrounding the device.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, of which:

Figure 1 is an exploded view of a radio telephone which may implement the present invention;

Figure 2 is a block diagram of a device whose operation depends on light and/or power detection according to an embodiment of the present invention;

Figure 3 shows light detection circuitry according to an embodiment of the present invention;

Figures 4a to 4c show examples of light detectors which could be incorporated in device of the present invention;

Figure 5 illustrates various methods of light detection circuitry according to a preferred embodiment of the present invention;

Figure 6a illustrates a method of operation of a device depending upon light detection;

Figures 6 and 7 illustrate various methods of operation of a device whose operation depends on power detection according to an embodiment of the present invention;

Figure 8 is a block diagram of the device whose operation depends upon the light estimation;

Figure 9 illustrates an exemplary look up table for estimating light levels; and

Figure 10 illustrates user profiles for setting the user interface to function in a certain manner for different operating conditions.

Figure 1 is an exploded view of a substantial part of a radio telephone 10, comprising a main body 11, front cover 12, and keymat 13. The keymat 13 comprises an array of depressible keys 16 and may, for example, be made from a simple piece of silicon rubber. The upper surfaces of the keys includes an indicia region which is painted so as to bear an indicia serving to indicate the functionality of the keys, e.g. alphanumeric character or other symbol. The main body 11 comprises a circuit board having a corresponding array of electrical contact regions (not shown). A contact membrane provides an array of domed contact elements 17 made from metal. Each contact element is arranged to lie intermediate to key 16 and its corresponding electrical contact region. Each key 16 has a projection depending centrally from its rear and when a key is depressed this projection causes the corresponding dome to contact element 17 to snap from a first natural bias position in which electrical connection is not effected to a second distorted position in which the contact element causes an electrical connection to be made.

The circuit board also comprises light emitting diodes (LEDs) 18 for backlighting keys. The membrane has corresponding holes, and the silicon rubber keymat is preferably translucent. Further, it is preferable if the rear of the keymat 16 has been moulded to provide a light guide from an LED 18 to a surrounding group of keys 16, so as to provide even backlighting.

The main body 11 also comprises a liquid crystal display (LCD) module 14. A row of LEDs 15 are provided on each side of this display so as to illuminate it.

The LCDs 15, 18 may be connected to the same or different control circuitry depending upon device requirements. Likewise, the keymat LCDs 18 may be controlled individually, as a group, or all together.

A method of controlling the LCDs using a transducer in accordance with an embodiment of the invention will now be described with reference to Figure 2.

The device of Figure 2 comprises transducers in the form of a light detector 21 and power detector 22. The device also comprises control means 23, and a user interface 24, having an input 25 and output 26. The input may, for example, be a keypad as in Figure 1, or alternatively a touch screen, voice detector or the like. The output may, for example, be a display as in Figure 1, or alternatively a loudspeaker or the like.

The control means 23 controls functionality relating to the user interface, depending upon the output of the transducers 21, 22, as follows.

The light detector 21 detects the level of light surrounding the device, converts it into a corresponding electrical signal and forwards it to the control means 23. The control means 23 stores the threshold level at which backlighting should be switched on/off and compares the detected light signal with this threshold. A detected light signal above the threshold is an indication of sufficient natural/artificial daylight and thus the backlighting is switched off. On the other hand, a detected light signal below the threshold is an indication of darkness, and consequently, the control means 23 turns the input and output backlighting on. In this event, the control means may switch the

backlighting permanently on. Alternatively, it may be arranged so as to only turn the backlighting on in certain circumstances, such as in response to an input by the user (e.g. key depression) or an incoming call.

If the control means 23 determines that the surroundings are dark, it preferably also samples the detected light signal over a predetermined period. If no variation is detected, it is assumed that the device is in a pocket, brief case etc. In this event, the control means 23 turns the backlighting and the output 26 off.

The light detector 21 is discussed in more detail below with reference to Figures 3 to 5. However, it may be positioned in a device for example anywhere in which it can detect external light. In a radiotelephone, for example, it may be provided by the display backlighting LEDs, or alternatively in the phone's call indicator LED aperture.

The power detector 22 detects the level of battery power, converts it into a corresponding electrical signal and forwards it to the control means 23. The control means 23 stores a threshold level at which backlighting should be switched off and compares the detected light signal with the threshold. A detected power signal below the threshold is an indication of low battery power, and thus the backlighting is switched off to conserve power. Alternatives power detection operation is discussed with reference to Figures 6 and 7 below.

Figure 3 illustrates a schematic diagram of the operation of key and display backlighting according to an embodiment of the present invention.

It is a series circuit comprising a battery, illuminator 33 and two switches, referenced 32 and 34. Switch 32 is operated under control of a control means

on the basis of the output of a light detector 31, and switch 34 is operated depending on other circumstances, 35, namely when a key is depressed or call received. Only when both switches are closed will the illuminator 33 turn on.

Control means 36 closes switch 32 if the light sensor 31 detects insufficient light.

Switch 34 is closed in response to an input, such as when a key is depressed or a call is received. Preferably, this switch 34 is closed for a predetermined period (e.g. 15 seconds) after the input and then reopens.

Consequently, only when the device is in sufficiently dark surroundings and an input is received will the illuminator 33 illuminate. As a result, power is conserved, resulting in an increase in operational time of the device.

The light detection part of this circuit operates according to the second illustration of Figure 6a. That is, the control means 36 compares the light detected by the light sensor 31 with a threshold L_{TH1}. If the light detected is above this threshold the switch is open and backlighting is off, whereas if it is below the threshold, the switched is closed and the backlighting is on (when switch 34 is closed). However, the light sensor 31 and switch 32 may be replaced by variable sensor, and the control means 36 arranged to operate according to the first illustration of Figure 6a. In this case, the control means 36 stores two threshold values, one indicative of minimum sufficient daylight, L_{TH1}, and one indicative of minimum night light, L_{TH2}. If there is sufficient daylight the backlighting is off, if it is dark the backlighting is on (assuming switch 34 is closed) and if the light detected is between the two (for example it dusk) then the backlight is partially illuminated (again assuming switch 34 is closed). Partial illumination may mean illumination of the display and not the

keypad, or it may mean only some of the LED's of the backlighting are illuminated. However, preferably it means that the intensity of the backlighting is inversely proportional to the light level detected i.e. it increases in intensity from the lowest threshold when it reaches L_{TH1} to maximum illumination when it reaches L_{TH2}.

Figure 4 illustrates typical light sensors which may be used in the device of the present invention. Figure 4a illustrates a photo resistor, and Figures 4b and c illustrates the photodiode arrangements.

Figure 5 illustrates in more detail light detection circuitry according to the preferred embodiment of the present invention. Operation of this circuit depends on the signal input to two inputs, a backlighting enable input 51 and a dimmer enable input 52. These inputs may be set by the user, for example by way of a menu option of the device. The circuitry provides an integrated light detection and backlight control means, and operates as follows. If the backlight input 51 receives a backlight disable signal (low), transistor Q3 switches. Q2 is biased so that in this event it too is switched off and consequently, backlighting LEDs D1 to Dn are off. The signal applied to the dimmer input is irrelevant in this instance.

In contrast, if the backlighting input 51 receives a backlighting enabled signal (high), transistor Q3 is turned on, which in turn results in transistor Q2 turning on. Consequently, the backlighting LEDs D1 to Dn obtain the necessary current to turn on. The intensity of these LEDs is determined by the signal applied to the dimmer input 52. If the signal is a dimmer disable signal, current is not drained from the collector of transistor Q2 and therefore the backlighting LEDs D1 to Dn illuminate at maximum intensity.

When the dimmer is enabled, on the other hand, transistor Q4 is switched on and the amount current drained from the collector of transistor Q2 depends upon the level of light detected by the photodiode PD. The less light detected the less current the photodiode draws, resulting in more illumination by the backlighting LEDs D1 to Dn.

The power detector 22 will now be described with reference to Figures 6b and 7. Figure 7 is a flow chart indicating a method of controlling the user interface depending on the power level of the device's battery and user's preferences. A user may have certain preferences as to whether any features are foregone in the event of power falling below a certain level, to conserve energy for other features, and also as to prioritisation of certain features. Take for example a portable device such as a radiotelephone, the user may not wish to forego a low battery light alert if the battery power drops below a threshold. However, assuming he does he may desire certain priorities. For example, he may decide that dialling is a priority and thus may wish to sacrifice some talk/standby time to retain keypad backlighting. On the other hand, he may decide that optimising the standby/talktime is his main priority, and is thus willing to forego backlighting and even operation of the display. Figure 6b illustrates these two options. In both of these cases, the control means has two threshold values, a first low battery threshold which may be, for example an indication that there is five minutes talktime left and a second low battery threshold which may, for example be an indication that there is a minutes talktime left. The first illustration of Figure 6b corresponds to when dialling is a priority and the second illustration corresponds to when standby/talktime is priority. In the embodiment of Figure 7 prioritisation occurs as follows. The user interface operates normally until the control means detects that the battery power level has fallen below the first threshold TH1 (step 701). The control means then determines whether the user has selected a form of prioritisation, or whether he wishes to receive a low battery light alert (step

702). If the latter is the case, an alert is given, as is conventional, until the power level is so low that the device turns off (step 710). However, if the prioritisation option has been selected, the control means determines the user priority feature and operates the user interface accordingly (step 703). If the dialling is a priority, the display backlight is turned off to conserve power (step 704), whilst leaving the keypad backlighting on to facilitate dialling. The control means periodically compares the detected power level with the second threshold TH2 (step 705) and once it falls below the second threshold, the keypad backlighting is turned off (step 706). Eventually, in the absence of battery charging, the device turns itself off. However, this option does enable a substantial increase in operational time of the device.

If standby/talktime is a priority as opposed to dialling, then the control means turns off both the display and keypad backlighting once the detected power level falls below the first threshold TH1 (step 707). Again, the control means periodically compares the detected power level with the second threshold TH2 (step 708) and once it falls below the second threshold, the display itself is turned off (step 709). Again, eventually in the absence of battery charging the device turns itself off (step 710). However, an even further improvement in operational time will have been obtained with this form of prioritisation.

Whilst the embodiment of Figure 2 shows two detectors, namely a light detector 21 and power detector 22, the invention is not restricted to the provision of both of these. According to this aspect of the invention, the device may comprise one or more transducers, operating either independently or in combination in order to control the user interface.

Figure 8 illustrates an alternative embodiment of the present invention, in which no extra hardware is required to improve power conservation. The device of Figure 8 comprises a light estimator 80, control means 83, and a

user interface 84, having an input 25 and output 26. The input may, for example, be a keypad touch screen voice detector or the like and the output may, for example, be a display loud speaker or the like as in the embodiment of Figure 2. The control means 83 controls functionality relating to the user interface, depending upon the output of the light estimator 80, as explained below. The device also comprises a real-time clock 81, and a locator 82 for providing information on which the light estimation is based.

To obtain a reasonable level of accuracy, the light estimator 80 performs estimation on the basis of time (date and time of year) and location (country/state). The current time is provided by the real-time clock 81, and location information is provided by the locator 82. Control means 83 then adjusts the user interface 84 in accordance with the estimated light levels, in a similar manner to if the levels have been received from the light detector.

Time information may be input to the real-time clock 81 by the user during device setting. Alternatively, if the device is a communication device, information may be received by the network it is connected to.

The locator 82 may determine location in a number of ways depending upon the type of devices and information available to it. For example, for a personal organiser type of device the locator may determine the location as the country corresponding to the device settings. This method is appropriate for a radiotelephone which has a geographically restricted operation due to the telecommunication system in which it is employed. However, the ethos behind systems such as GSM is that it is a standard for a multitude of countries, so that a GSM device is truly portable. As will be appreciated, ambience conditions vary significantly across the European countries for a given time and also to different extents during different seasons. Hence, in order to get a relatively accurate estimate of light levels, the locator 82

preferably employs an alternative method. One such method is determining the location on the basis of the operator been employed by the device. Figure 9 illustrates a portion of a look up table which could be employed by the light estimator 80 in such in an embodiment.

The look up table comprises a list of the network operators (A, B .....) for the system in which the device will operate, and for each operator a light level is given for periods throughout the day for each for the four seasons. (In this embodiment, the light levels are between zero and eight, where zero is minimum light and eight is maximum light). The real-time clock 81 forward the time and date (season) to the light estimator 80 and the locator 82 forwards the operation information. From this information, the light estimator 80 can estimate the daylight level, and forward this level to the control means 80. The control means 80 varies the backlighting of the user interface 84 depending on the daylight levels. For example, the control means may turn the backlighting fully on if the light estimation level is between zero and two, it may provide a dimmed backlighting if the level is between three and four, and may turn the backlighting off if the level is between 5 and 8. In this way, the device can conserve power, and thus increase the available talktime/standby time.

In certain systems, location information is provided by the telecommunications network, SIM (Subscriber Identity Module), location register etc. This may enable the locator 82 to provide more specific location information, thus improving the estimation further. Moreover, if the device comprises GPS (Global Position System), then even further improved location information may be provided.

In order to take into account situations in which the device is not under natural light conditions (for example if the user is working in a tunnel during the day),

the device is preferably provided with a manual selection option for overriding the light estimation. Alternatively, in order to conserve power further, the device may be arranged to take into account the situation when the device is in artificial light conditions (e.g. in an office etc) in addition to when it is natural light conditions. This may be achieved by the light estimator determining artificial light conditions on the basis of user profiles and/or agenda settings which are stored in the device.

In the preferred embodiment, the user can set the user interface to function in a desired manner for different operating environments. Typical profiles may include outdoor, meeting, silent and office environments. Backlighting options for these profiles may be seen in Figure 10.

Figure 10a illustrates a profiles menu, and Figures 10b to e illustrate the options available within those profiles. In each case, option A is the default option. Take, for example, the outdoor mode, the default option is that the backlighting is on all the time. However, in the event that the user wishes to conserve power and yet still wishes to be able to see the user interface in the dark, he may choose to select option B, in which the light estimation operates as in the previous embodiment. Alternatively, in order to provide an option whereby power is conserved at the cost of been able to see the user interface, option C is provided. Option D, which is a timing option is an available option for each profile. If selected, this option lets the user input when the particular profile is required to operate. For example, the user may spend some days pursuing outdoor activities, and thus may set the backlighting to be determined by the light estimator (option B) for a Sunday afternoon between 10.00am and 4.00pm (timing option D).

Periods when power consumption maybe substantially reduced due to the presence of artificial light mainly occur when the user is at home or in the

office. In these situations, backlighting is unlikely to be required, and thus the default option A for the office option is set to off. The user can input the hours when the office option is to be enabled via option C. For example, the office profile may be selected for Monday to Friday between the hours of 9.00 and 5.30.

If the device comprises a calendar option, then the agenda settings may be linked to this calendar as opposed to by way of the separate timing menu.

User profiles may also be used to set option for controlling the user interface depending on other factors such as the output from the previously mentioned light detector and/or power detector.

The present invention may be embodied in other specific forms without departing from its essential attributes. Accordingly reference should be made to the appended claims and other general statement's herein rather than to the foregoing specific description as indicating the scope of invention.

Furthermore, each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features. In this regard, the invention includes any novel features or combination of features disclosed herein either explicitly or any generalisation thereof irrespective of whether or not it relates to the claimed invention or mitigates any or all of the problems addressed.

The appended abstract as filed herewith is included in the specification by reference.

Claims

1. A handportable device comprising:

a user interface;

means for determining a current circumstance of the device;

a comparator for comparing the current circumstance with a given threshold; and

control means for controlling functionality relating to the user interface depending upon the output of the comparator.

2. A device as claimed in claim 1, wherein the control means controls an illuminator for illuminating the user interface.

3. A device as claimed in claim 1 or 2, wherein the control means controls operability of the user interface.

4. A device as claimed in any preceding claim, wherein the means for determining a current circumstance of the device comprises means for determining the ambience around the device.

5. A device as claimed in claim 4, wherein the means for determining a current circumstance of the device comprises a light detector.

6. A device as claimed in claim 5, when dependent upon claim 2, wherein the control means disables the user interface illuminator in response to an indication by the comparator that the light detected exceeds a first threshold.

7. A device as claimed in claim 5 or 6, wherein the control means enables the user interface illuminator in response to an indication by the comparator that the light detected is less than a second threshold.

8. A device as claimed in claim 7, when dependent upon claim 6, wherein the control means partially enables the user interface illuminator in response to an indication by the comparator that the light detected is between the first and second thresholds.

9. A device as claimed in any of claims 5 to 8, further comprising means for determining a change in output of the light detector over a predetermined period, wherein the control means is arranged to disable functionality relating to the user interface in response to an indication that no change is determined.

10. A device as claimed in claim 9, wherein the control means is arranged to disable the user interface in response to an indication that no change is determined.

11. A device as claimed in claim 9 or 10, wherein the control means is arranged to disable the user interface illuminator in response to an indication that no change is determined.

12. A device as claimed in claim 4, wherein the means for determining a current circumstance of the device comprises a light estimator.

13. A device as claimed in claim 12, when dependent upon claim 2, wherein the control means disables the user interface illuminator in response to an indication by the comparator that the estimated light exceeds a first threshold.

14. A device as claimed in claim 12 or 13, wherein the control means enables the user interface illuminator in response to an indication by the comparator that the estimated light is less than a second threshold.

15. A device as claimed in claim 14, when dependent upon claim 13, wherein the control means partially enables the user interface illuminator in response to an indication by the comparator that the estimated light is between the first and second thresholds.

16. A device as claimed in any of claims 12 to 15, wherein the light estimator estimates the current light on the basis of time information.

17. A device as claimed in claim 16, wherein the light estimator also estimates the current light on the basis of date information.

18. A device as claimed in claim 16 or 17, wherein the light estimator is controlled by a real time clock.

19. A device as claimed in any of claims 16 to 18, wherein the light estimator also estimates the current light on the basis of location information.

20. A device as claimed in any preceding claim, wherein the means for determining a current circumstance of the device comprises a power detector.

21. A device as claimed in claim 20, when dependent upon claim 2, wherein the control means at least partially disables the user interface illuminator in response to an indication by the comparator that the power detected is less than a first threshold.

22. A device as claimed in claim 20 or 21, when dependent upon claim 3, wherein the control means at least partially disables the user interface and/or illuminator in response to an indication by the comparator that the power detected is less than a second threshold.

23. A device as claimed in any preceding claim, wherein the user interface comprises input means responsive to a user.

24. A device as claimed in claim 23, wherein the control means control the functionality relating to the user interface on the basis of settings input by the user via the input means.

25. A device as claimed in claim 23 or 24, wherein the input means comprises touch means, such as a key and/or display region.

26. A device as claimed in any preceding claim, wherein the user interface comprises output means.

27. A device as claimed in claim 26, wherein the output means comprises a display.

28. A device as claimed in any preceding claim, which is a portable communications device such as a radiotelephone.

29. A method of controlling functionality of the user interface of a portable device, the method comprising:

determining a current circumstance of the device;

comparing the current circumstance with a given threshold; and

controlling functionality relating to the user interface depending upon the result of the comparison.

30. A system for controlling the functionality of a user interface of a portable device, the system comprising:

means for determining a current circumstance of the device;

a comparator for comparing the current circumstance with a given threshold; and

control means for controlling functionality relating to the user interface depending upon the output of the comparator.

31. A portable device substantially as hereinbefore described with reference to and/or as illustrated in any one or any combination of the Figures of the accompanying drawings.

32. A method of controlling functionality of the user interface of a portable device substantially as hereinbefore described with reference to and/or as illustrated in any one or any combination of the Figures of the accompanying drawings.

33. A system for controlling the functionality of a user interface of a portable device, substantially as hereinbefore described with reference to and/or as illustrated in any one or any combination of the Figures of the accompanying drawings.

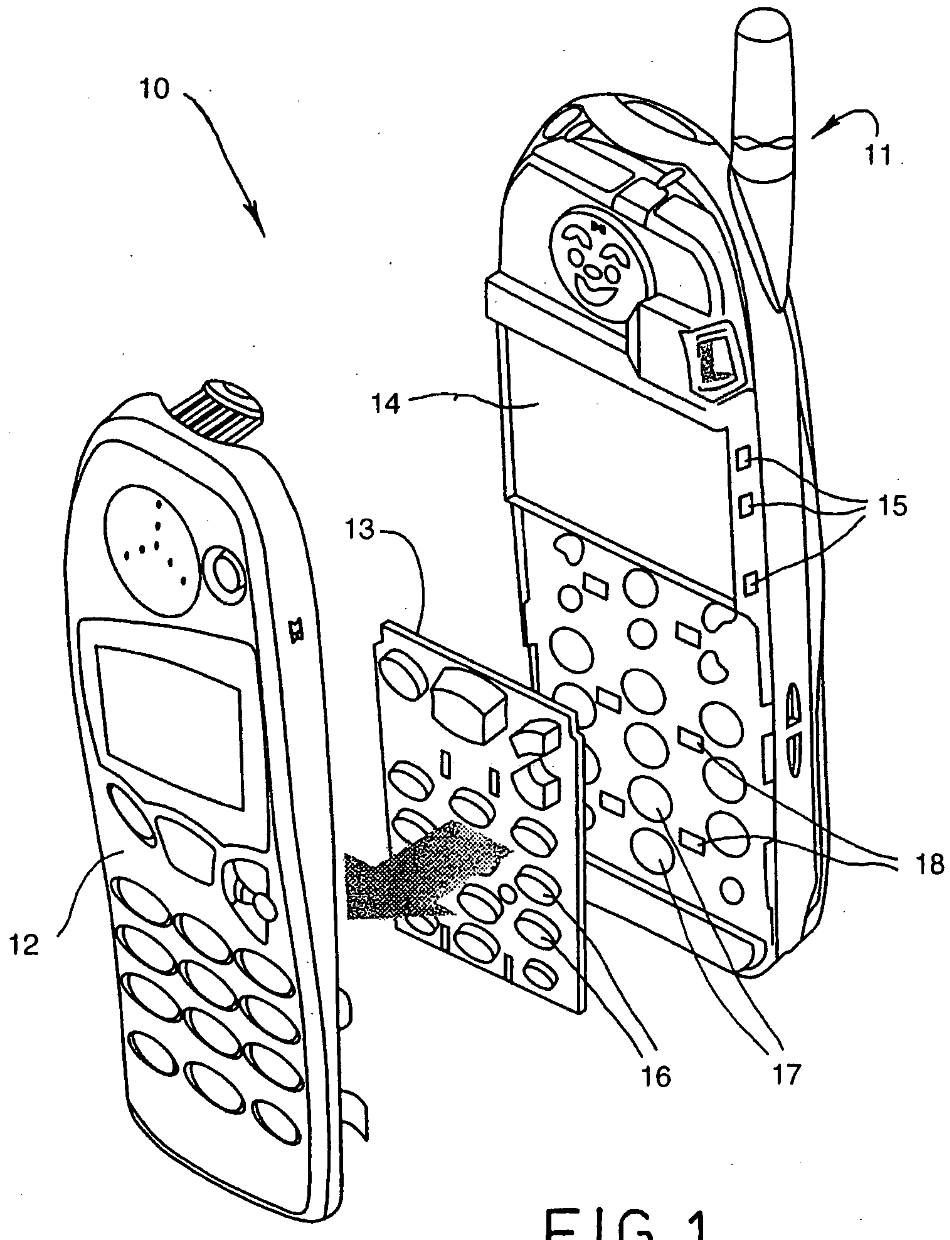

FIG. 1.

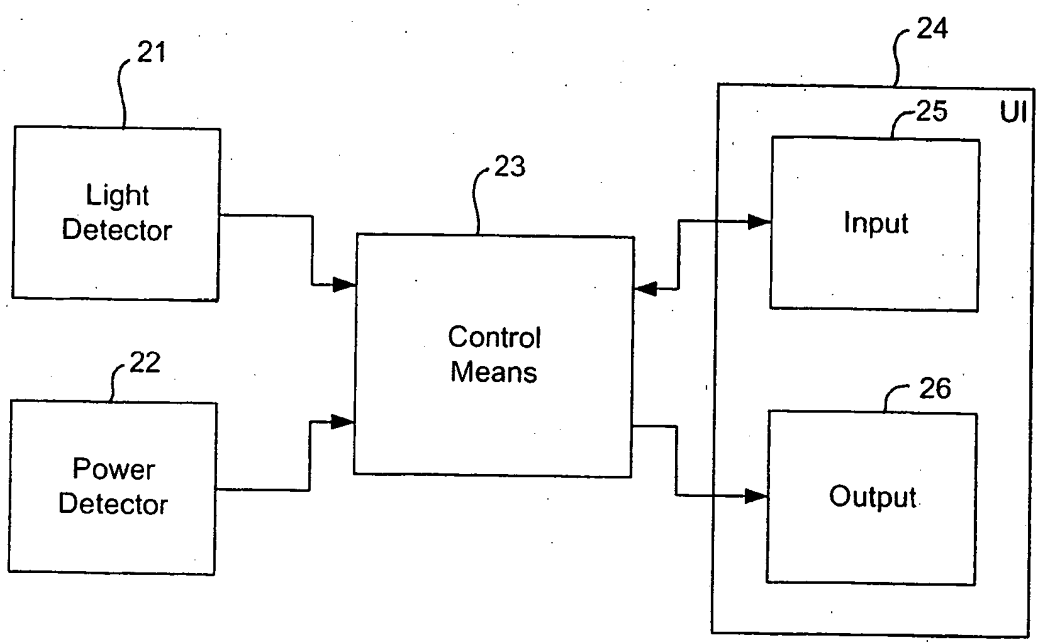
21
Light Detector
22
Power Detector
23
Control Means
24
25
UI
Input
26
Output

FIG. 2.

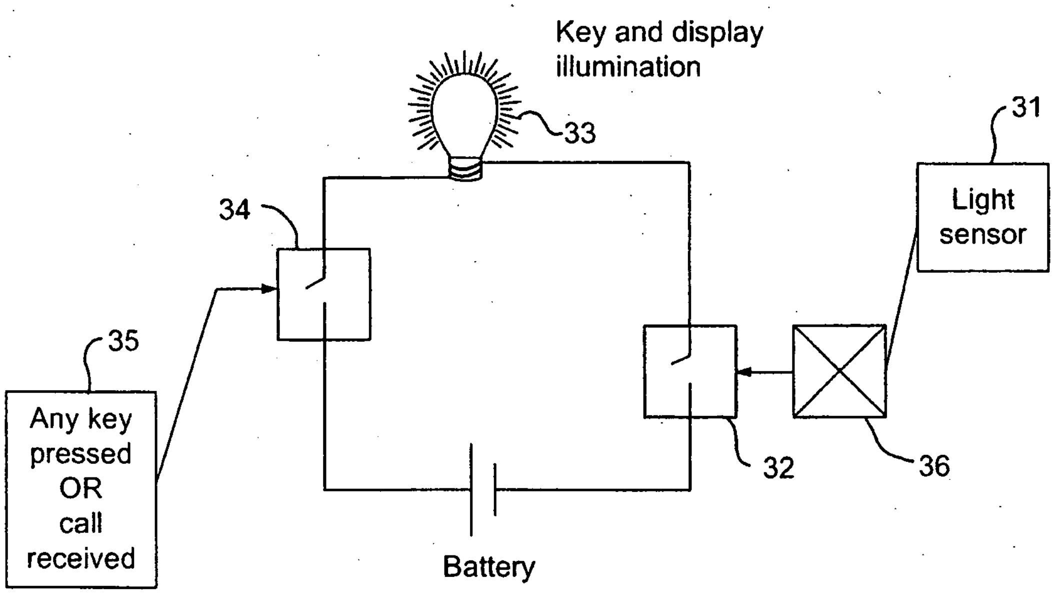
Key and display illumination
33
31
Light sensor
34
35
Any key pressed OR call received
32
36
Battery

FIG. 3.

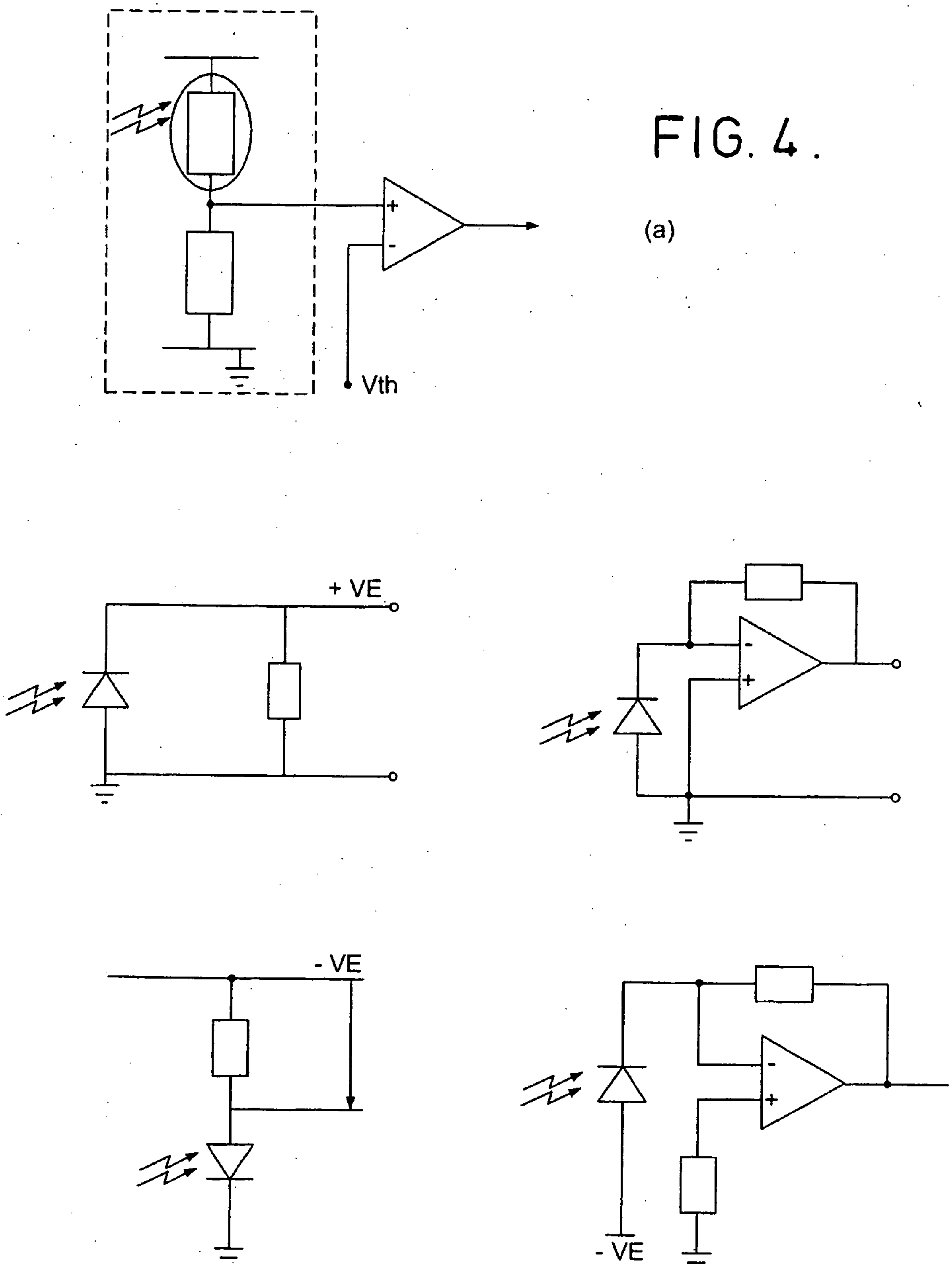

FIG. 4.

(a)

(b)

(c)

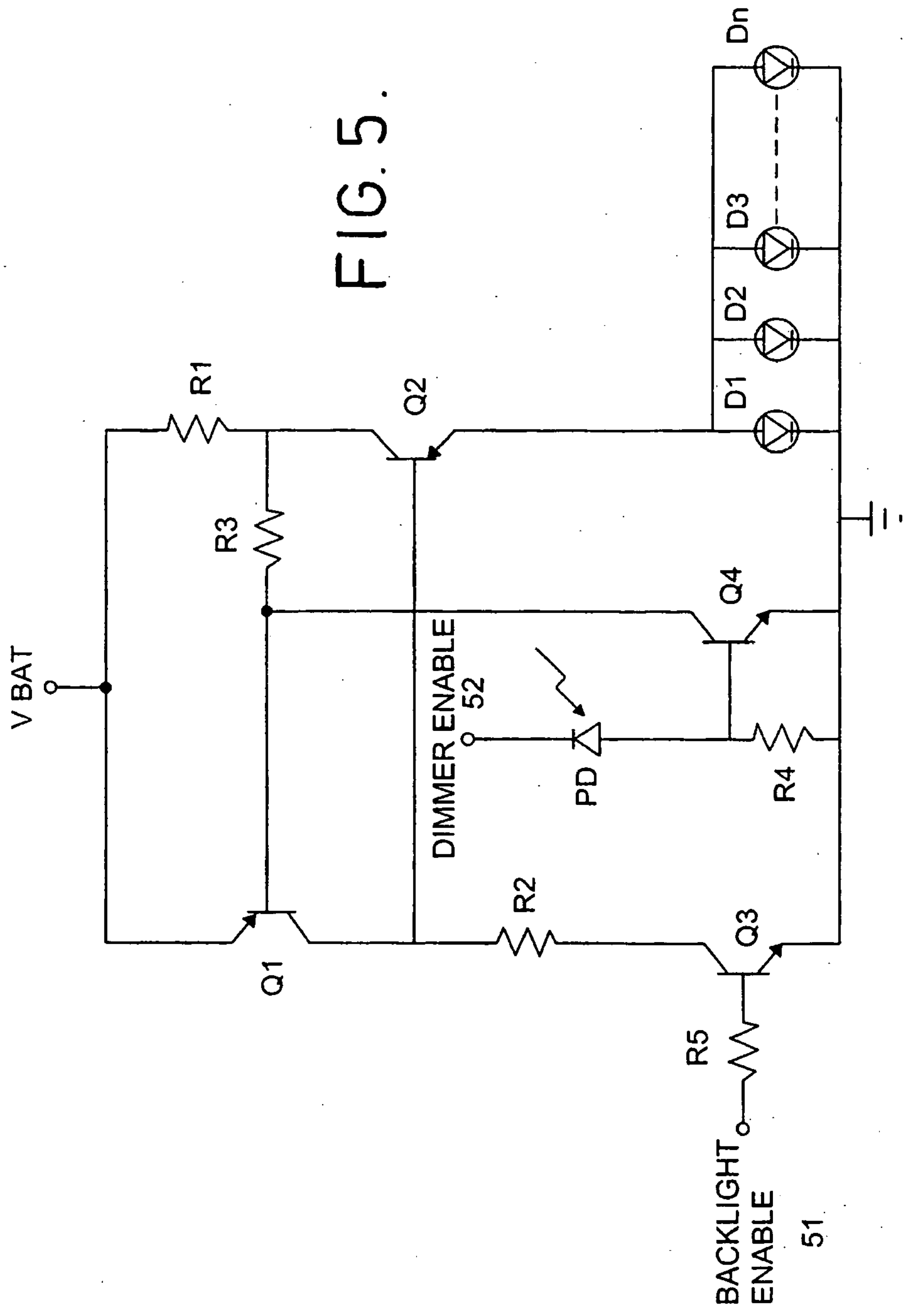
V BAT
R1
R3
Q2
Q1
R2
DIMMER ENABLE
52
PD
Q4
R4
Q3
R5
BACKLIGHT
ENABLE
51
D1
D2
D3
Dn

FIG. 5.

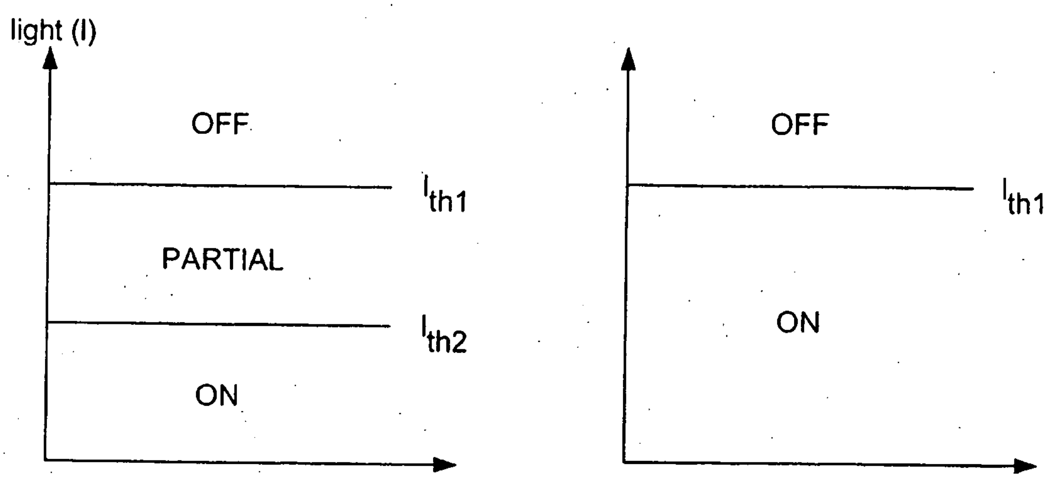
light (I)
OFF
I_{th1}
PARTIAL
I_{th2}
ON
OFF
I_{th1}
ON

FIG. 6(a)

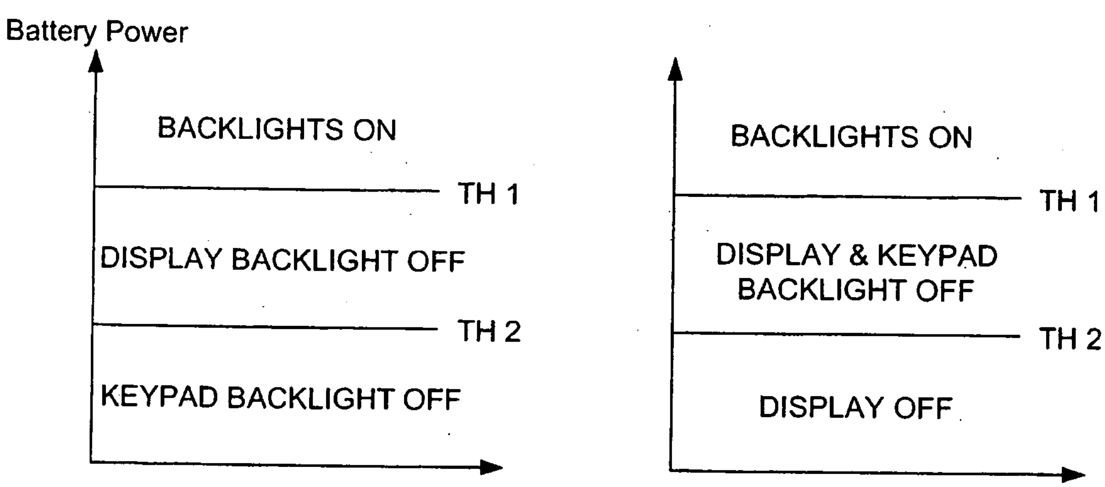
Battery Power
BACKLIGHTS ON
TH 1
DISPLAY BACKLIGHT OFF
TH 2
KEYPAD BACKLIGHT OFF
BACKLIGHTS ON
TH 1
DISPLAY & KEYPAD
BACKLIGHT OFF
TH 2
DISPLAY OFF

FIG. 6(b)

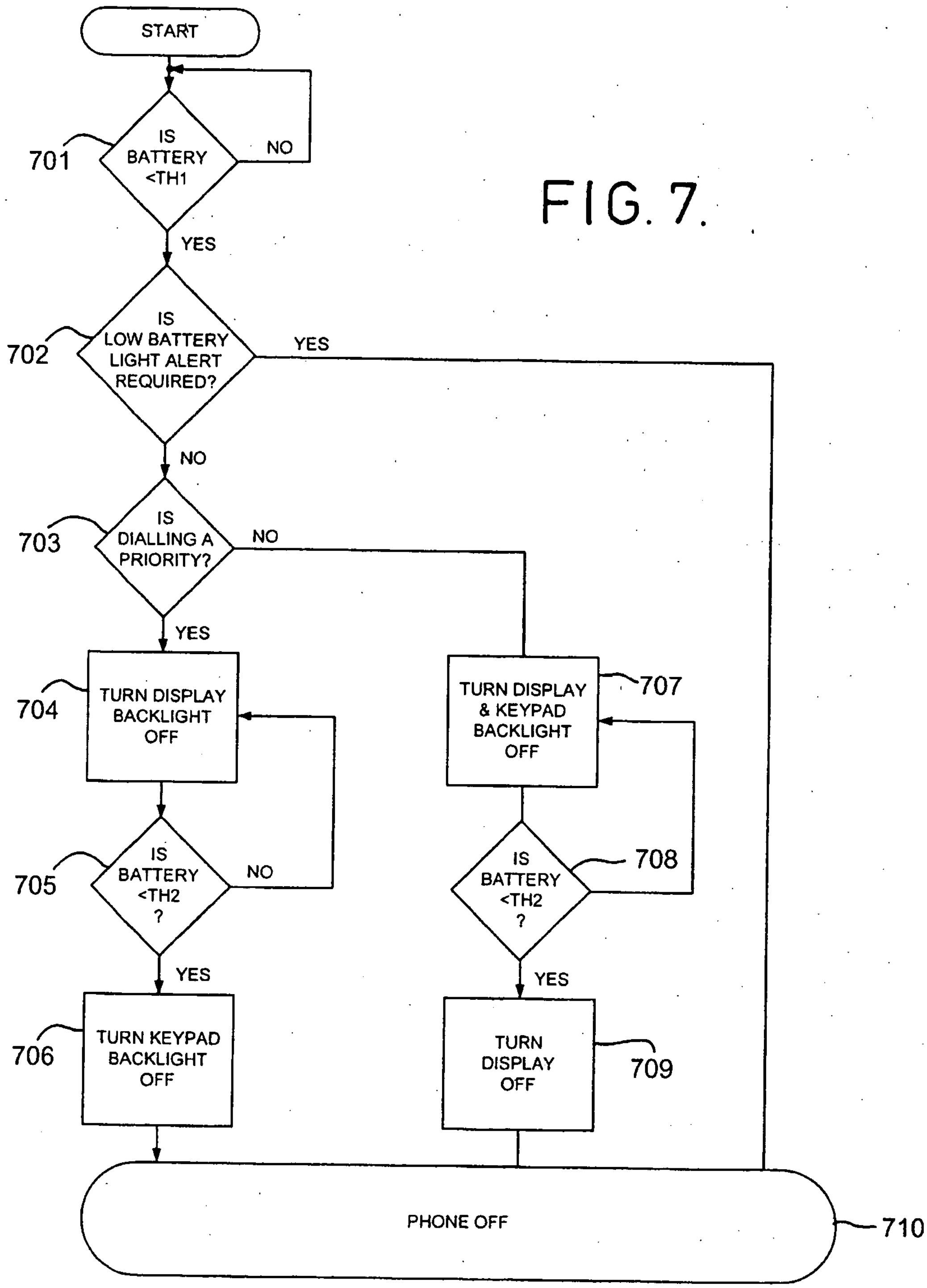
START
IS BATTERY <TH1
NO
YES
IS LOW BATTERY LIGHT ALERT REQUIRED?
YES
NO
IS DIALLING A PRIORITY?
NO
YES
TURN DISPLAY BACKLIGHT OFF
TURN DISPLAY & KEYPAD BACKLIGHT OFF
IS BATTERY <TH2 ?
NO
YES
IS BATTERY <TH2 ?
YES
TURN KEYPAD BACKLIGHT OFF
TURN DISPLAY OFF
PHONE OFF
701
702
703
704
705
706
707
708
709
710

FIG. 7.

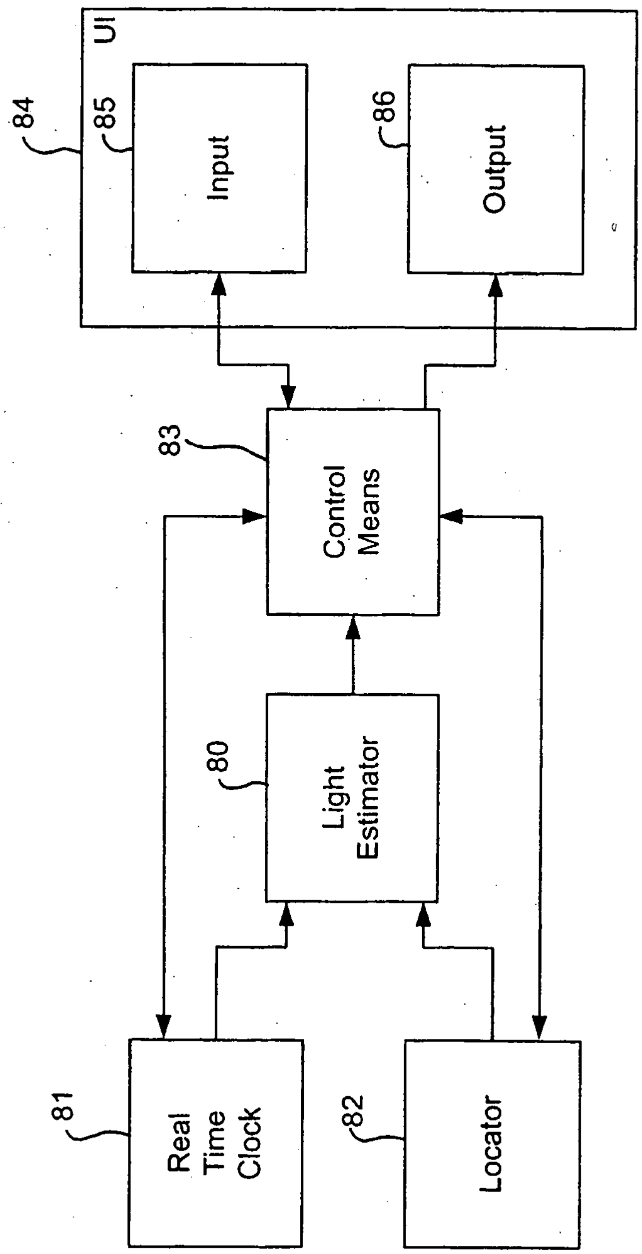
UI
Input
Output
Control Means
Light Estimator
Real Time Clock
Locator
84
85
86
83
80
81
82

FIG. 8.

OPERATOR	DATE	TIME	DAYLIGHT LEVEL
A	SPRING	00:00-07:00	0
		07:00-08:00	3
		08:00-09:00	6
		09:00-15:00	8
		15:00-16:00	7
		16:00-17:00	6
		17:00-18:00	5
		18:00-19:00	4
		19:00-20:00	3
		20:00-21:00	2
		21:00-00:00	1
	SUMMER	00:00-06:00	0
	⋮		
	AUTUMN	00:00-08:00	0
	⋮		
	WINTER	00:00-09:00	0
	⋮		
B	SPRING	00:00-07:00	0

FIG. 9.

PROFILES
1. Outdoor
2. Meeting
3. Silent
4. Office

(a)

1. OUTDOOR

a) Backlighting on
b) Light Estimator
c) Backlighting off
d) Timing

(b)

2. MEETING

a) Backlighting off
b) Backlighting on
c) Timing

(c)

3. SILENT

a) Backlighting on
b) Light Estimator
c) Backlighting off
d) Timing

(d)

4. OFFICE

a) Backlighting off
b) Backlighting on
c) Timing

(e)

FIG. 10.

INTERNATIONAL SEARCH REPORT

Inte   onal Application No
PCT/GB 99/04447

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/22 H04M1/02 H04M1/73

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M G09G G02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 08, 30 June 1998 (1998-06-30) & JP 10 084408 A (NIPPON DENKI IDO TSUSHIN KK), 31 March 1998 (1998-03-31)	1-6,12, 16,18, 23-33
Y	abstract	7-11, 13-15, 17,19
Y	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 03, 29 March 1996 (1996-03-29) & JP 07 294877 A (CASIO COMPUT CO LTD), 10 November 1995 (1995-11-10) abstract	7,8, 13-15

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 May 2000	16/05/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Golzio, D

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International Application No
PCT/GB 99/04447

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 009, no. 150 (E-324), 25 June 1985 (1985-06-25) & JP 60 031393 A (NIPPON DENKI KK), 18 February 1985 (1985-02-18) abstract	9-11
Y	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 04, 30 April 1997 (1997-04-30) & JP 08 338981 A (NEC CORP), 24 December 1996 (1996-12-24) abstract	17,19
X	US 5 854 617 A (CHOI YUN-HO ET AL) 29 December 1998 (1998-12-29) abstract column 5, line 15-46 column 8, line 36 -column 10, line 17 figures 1-5	1,2, 20-22, 29-33
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 009 (E-1303), 8 January 1993 (1993-01-08) & JP 04 241549 A (SONY CORP), 28 August 1992 (1992-08-28) abstract	1,29-33
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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte ional Application No
PCT/GB 99/04447

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		CN 1157519 A	20-08-1997